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(CASE REPORT)

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Acute interstitial lung disease revealing dermatomyositis: Case study and analysis of diagnostic challenges

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Abstract

Dermatomyositis (DM) is a rare, heterogeneous autoimmune disease of unknown cause, characterised by non-infectious inflammatory involvement of the muscles and skin associated with vasculopathy. It is also associated with visceral manifestations, particularly of the lungs. Various respiratory manifestations, sometimes combined, may be observed in DM, including involvement of the aerodigestive tract, involvement of the respiratory muscles and diffuse interstitial pneumonitis (DIP). Diffuse interstitial lung disease (DIL) is common and can be acute in onset, and is often associated with a specific class of myositis autoantibodies, including anti-MDA-5 antibodies, which are associated with a particular phenotype of DM, in which muscle involvement is minimal or absent but the risk of rapidly progressive interstitial lung disease is particularly high. We report a case of rapidly progressive acute diffuse interstitial lung disease revealing amyopathic dermatomyositis characterised by the presence of anti-MDA-5 autoantibodies.

Keywords: Dermatomyositis; MDA-5 antibody; Interstitial lung disease; Gottron papules.

1. Introduction

Idiopathic inflammatory myopathies (IIMs) are connective tissue diseases characterised by muscular and extramuscular signs, in which pulmonary involvement plays a decisive role. They mainly include dermatomyositis (DM) and anti-synthetase syndrome. Dermatomyositis is a distinct subgroup of autoimmune myositis, defined by characteristic cutaneous manifestations. They can occur in both children and adults. There are phenotypic variations between DMs, both in terms of cutaneous-muscular presentation (e.g. amyopathic) and extra-cutaneous-muscular manifestations (such as associated pulmonary or joint involvement). Several myositis-specific autoantibodies are detected in more than half of all cases of dermatomyositis (DM) [1]. A new autoantibody, called anti-MDA-5 (melanoma differentiation-associated gene 5), has recently been identified. It appears to be associated with a particular phenotype of DM, characterised by minimal or no muscle involvement, but a high risk of rapidly progressive interstitial lung disease that can be very serious [2], with a poorer prognosis [3] and a very high mortality rate, particularly when lung involvement is rapidly progressive [4].

2. Patient and observation

A 26-year-old patient from a 1st-degree consanguineous marriage, treated for asthma for 2 years on background therapy (long-acting beta-2-agonists and inhaled corticosteroids), with a known food allergy to lemon and strawberry and a family history of atopy. For the past 3 months, she has been suffering from worsening dyspnoea (initially Sadoul stage II, now Sadoul stage III), with progressive onset of joint pain associated with erythematosquamous lesions on the joints of her hands, elbows, trunk and face (she consulted a dermatologist, who treated her as if she had eczema). The

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course was marked by the onset 15 days ago of Sadoul stage V wheezing dyspnoea with a productive cough producing whitish sputum associated with profound asthenia. Physical examination revealed polypnoea at 36 cpm, tachycardia at 138 bpm, desaturation at 88% on room air, fever at 38.5°C, haematuria and proteinuria on urine dipstick. The pleuropulmonary examination revealed diffuse bilateral crackles with a PEF of 200 L/min with no improvement after bronchodilators. Skin examination revealed scarring pigmented lesions on both upper and lower limbs, banded erythema, Gottron papules and a mechanic's hand appearance, erythema on the nape of the neck and on the sides of the neck, and erythema on the décolleté, giving the V sign (Figure 1). The thoracic CT scan showed bilateral ground-glass areas, more marked on the central and peripheral right, associated with interlobular reticulation and scattered thickening of the septal lines indicating non-specific interstitial lung disease (NSIP), associated with bilateral asymmetric condensation foci consistent with organised pneumonitis (OP) (Figure 2). The skin biopsy showed the absence of a lupus band or perivascular immune deposits on immunological study using a direct IF technique (Figure 3). The autoimmune work-up (AAN, ANCA, FR) was negative and the search for myositis-specific autoantibodies (including anti-J-O1, EJ, OJ, PL7, PL12, Mi2, Ku, SRP, Scl-70 and anti-PM/Slc) was also negative, while anti-MDA-5 came back positive. CPK levels were normal. Bronchial fibroscopy and lung biopsy could not be performed because of the rapid worsening of the clinical condition. Arterial blood gases showed severe type I respiratory failure (PaO2 37.3 mmHg). Corticosteroid therapy was started at a dose of 1 mg/kg/d combined with cyclophosphamide 1g daily. However, these treatments failed to halt the unfavourable course of the disease, necessitating transfer to intensive care. The patient was intubated, ventilated and unfortunately died.

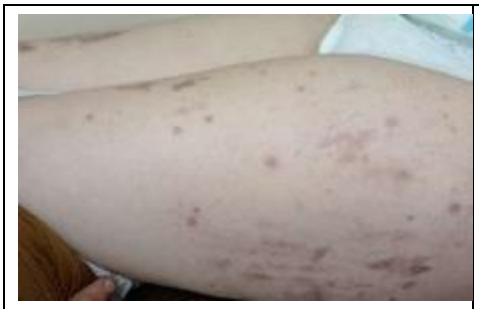
3. Discussion

IIM is a rare disease that can occur at any age, and forms part of a large group of muscle diseases known as ‘myositis’, which are manifested by chronic inflammation of the skeletal muscles. These conditions are often marked by muscle pain and can progress to muscle weakness. The precise diagnosis of these conditions can be complex due to the need to differentiate them from other similar conditions, such as toxic, drug-induced, infectious, metabolic or genetic myopathies. The worldwide prevalence of IIM is estimated to be between 2.4 and 33.8 per 100,000 people [5]. There are several methods of classifying IIM, based on two distinct approaches: a clinico-histological approach and a clinico-serological approach; this approach is based on the presence of auto Ac and extramuscular manifestations, it is a classification which is relatively simple and more relevant in particular in the context of inflammatory myositis associated with PID, it is a classification which proposes to place patients in 4 subgroups (Figure 4); Overlapping myositis which includes SAS, DM, then autoimmune necrotising myositis and inclusion myositis. Although mainly characterised by muscular and cutaneous involvement, DM can also be accompanied by pulmonary involvement in the form of ILD. Studies show that ILD is present in around 21% of patients with dermatomyositis [6], and is particularly common in forms associated with specific autoantibodies, such as anti-MDA-5, which was identified in our clinical case. Anti-MDA-5 is often associated with a rapidly progressive form of ILD, which corresponds to the clinical course observed in our patient, characterised by a rapid worsening of dyspnoea and radiological abnormalities typical of non-specific ILD (NSILD) and organised pneumonitis (OP).

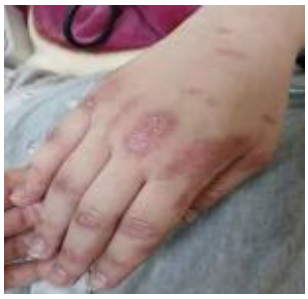
The pathophysiological mechanisms involved in the development of interstitial lung disease in DM remain poorly understood and are probably multifactorial, combining immunological, infectious and genetic elements. Dysregulation of cellular immunity appears to play a key role, as evidenced by the presence of effector immune cells in early lung lesions [7-8]. These T lymphocytes may stimulate fibroblast proliferation and collagen synthesis, thereby promoting the development of interstitial lung disease in this context [7-9-10]. Furthermore, the anti-MDA-5 autoantibody found in this patient is strongly associated with a DM phenotype with severe pulmonary involvement and an often unfavourable clinical course [11].

Anti-MDA-5 antibodies have recently been identified as specific markers of a distinct form of DM, characterised by hypo- or amyopathic involvement. This particular form is associated with an increased risk of rapid development of interstitial lung disease. MDA-5, formerly known as CDAM-140 (140 kDa clinical amyopathic dermatomyositis antibody), is a cytoplasmic protein involved in the immune response, playing a key role in this severe manifestation of the disease. The disease is systemic, with a poorer prognosis due to pulmonary involvement in over 80% of cases. Skin involvement is characterised by the presence of skin ulcerations, which are often severe, and the presence of mechanic's hands [12]. Muscle involvement is generally mild or absent, with CPK levels often normal. Muscle biopsy rarely reveals signs typical of dermatomyositis, such as perifascicular atrophy or HLA-1 expression [13]. Clinically, patients often present with inflammatory joint manifestations such as arthralgia and arthritis, as well as constitutional fever. However, the systemic involvement of greatest concern in this subgroup is interstitial lung disease, which progresses rapidly and has a severe prognostic impact [14]. In our patient, the pulmonary manifestations appeared in a context of dermatomyositis with characteristic cutaneous signs, such as Gottron's papules and banded erythema, typical signs of DM. The pulmonary abnormalities were revealed by a chest CT scan showing bilateral ground-glass opacities and interlobular reticulations,

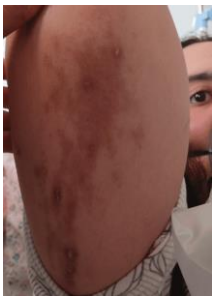
features commonly seen in dermatomyositis-associated ILD. The optimal management strategies for dermatomyositis associated with anti-MDA-5 antibodies have not yet been clearly established. There is no definitive consensus on the effectiveness of early intervention with corticosteroids, immunosuppressants, or immunoglobulins. The prognosis remains concerning, with a 40% mortality rate within the first year following diagnosis in patients with anti-MDA-5 antibodies, compared to 10% for classic dermatomyositis, where no deaths are observed during the first year [15,16]. The management of ILD in the context of DM primarily relies on a combination of corticosteroids and immunosuppressants. High-dose glucocorticoids are the first line of treatment, aimed at quickly controlling pulmonary inflammation. However, due to the high risk of rapid ILD progression, patients often receive combination therapy with immunosuppressants such as cyclophosphamide, azathioprine, or mycophenolate mofetil, which help reduce the corticosteroid dose and limit their long-term side effects. [17].



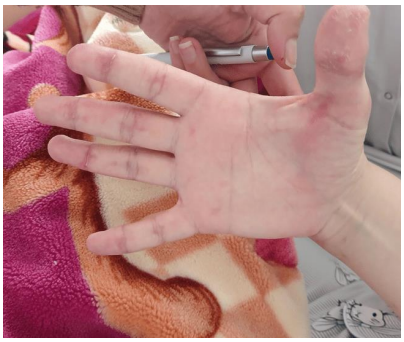
Holster sign: erythema on the lateral aspect of the thigh.

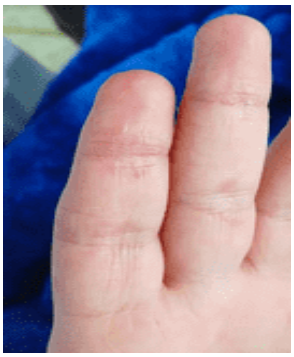


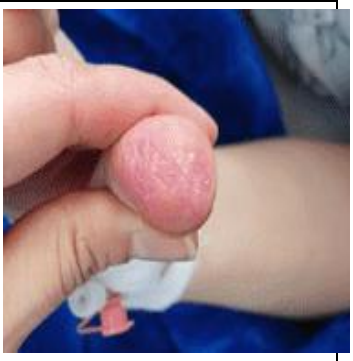
Band erythema



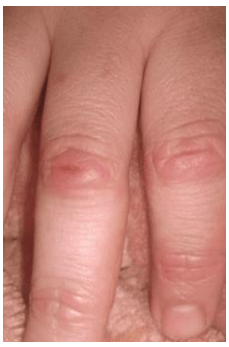
Psoriatic lesions on the upper limbs

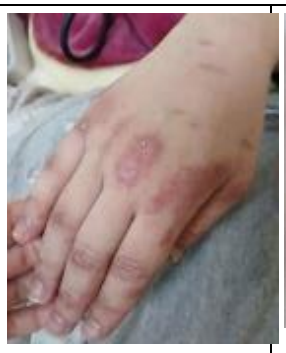




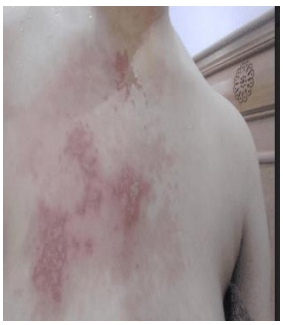


Mechanic's hand: Fissural hyperkeratosis of the palms, pulps and lateral surfaces of the fingers in the absence of trauma or exposure to caustic products.

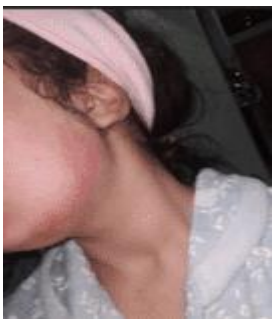




Gottron papules: Erythematous, finely scaly papular lesions on the back of the hands opposite the MCP and interphalangeal joints, with a banded appearance.



V sign: erythema of the décolletagearticulation MCP et inter-phalangiennes avec aspect en bandes.



Shawl sign: erythema on the nape of the neck

Figure 1 Typical skin signs of dermatomyositis

In some patients, particularly those with anti-MDA-5 antibodies, the prognosis remains guarded, and the effectiveness of treatments may be limited. Intravenous immunoglobulins (IVIG) are sometimes used as an adjunct, especially in cases

of insufficient response to conventional treatments, although evidence of their efficacy is still limited. [12,17]. Targeted therapies, such as rituximab, a monoclonal antibody directed against B lymphocytes, have also shown promising results in some studies, particularly in patients refractory to standard treatments. However, additional studies are needed to better define their role in the treatment of DM-associated ILD. [17].

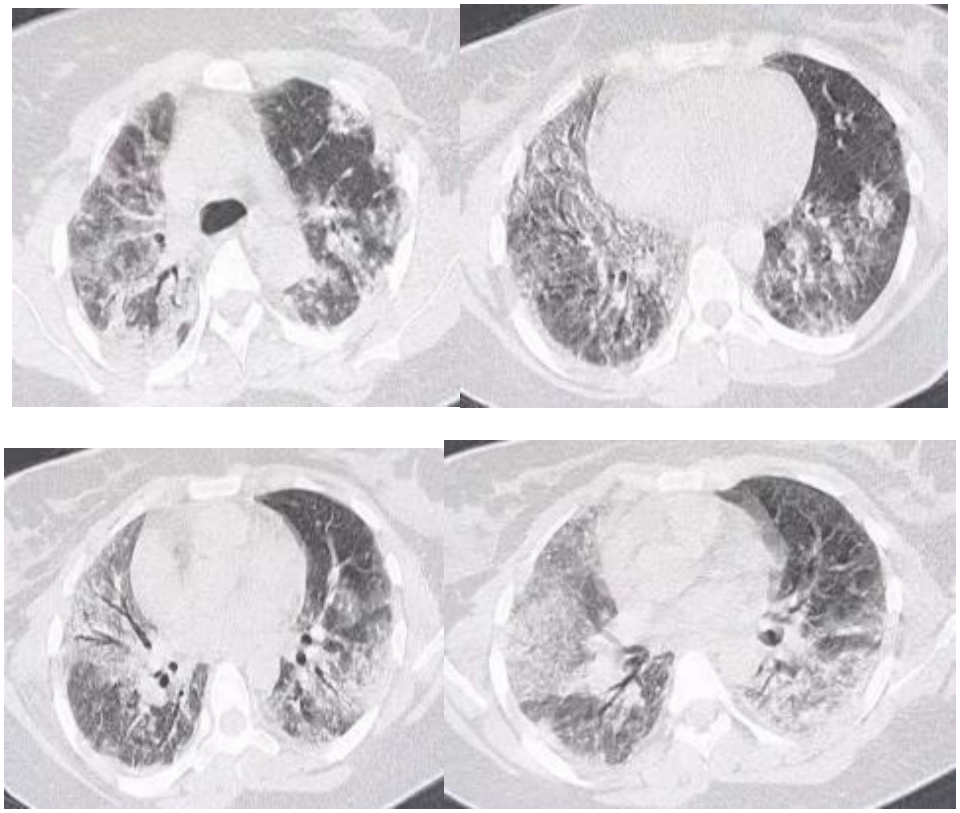


Figure 2 Bilateral ground-glass opacities, more pronounced centrally and peripherally on the right, associated with interlobular reticulations and scattered thickening of the septal lines, indicative of NSILD (non-specific interstitial lung disease), along with bilateral and asymmetric areas of consolidation consistent with organizing pneumonia.

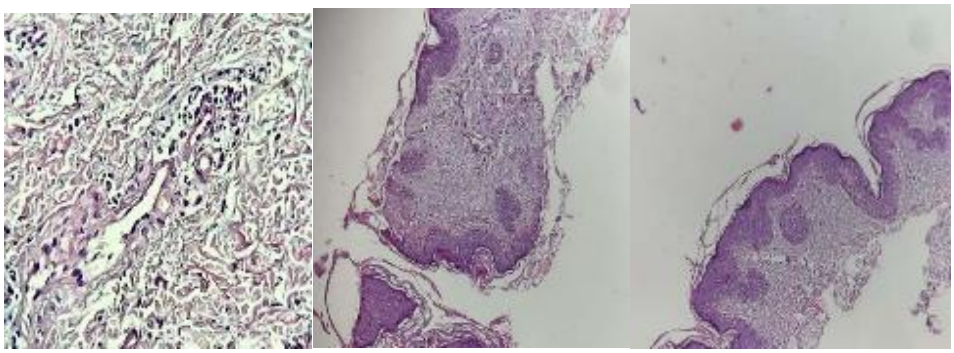


Figure 3 Skin biopsy: Histological examination reveals a morphological appearance that could be compatible with discoid lupus. Immunological study using direct immunofluorescence technique shows the absence of a lupoid band or peri-vascular immune deposits.

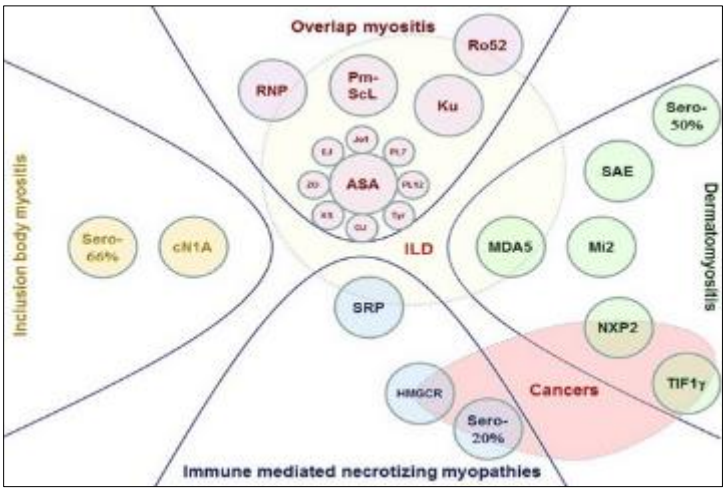


Figure 4 Classification of IIM according to aAc. ASA: anti-synthetase antibodies, sero-: seronegative MII (Benveniste, 2016) [18].

4. Conclusion

Dermatomyositis associated with diffuse interstitial lung disease should always be considered in cases of unexplained acute respiratory distress syndromes. The importance of a rapid and accurate diagnosis cannot be overstated, and an emergency immunological workup, including a myositis panel, is essential for guiding therapeutic management. This proactive approach could significantly improve patient outcomes by enabling early and appropriate therapeutic intervention. Further research is needed to better understand the underlying mechanisms and to optimize treatment strategies.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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